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Children's conformity to social influence on healthy eating: A developmental perspective

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Introduction

Because obesity poses a variety of health risks to children, various approaches have been used to tackle childhood obesity, including the encouragement of healthy eating (Berg et al., 2000; Stok et al., 2018), increased physical activity (Godin et al., 2005; Raudsepp et al., 2010), and improved labeling on food and drink (Department of Health & Social Care, 2015). However, their impact is questionable, because recent statistics suggest that childhood obesity levels remain unchanged (National Health Service, 2017). Recently, the focus has shifted to the use of social influence approaches, such as encouraging parents to be role models for their children in tackling obesity (US Department of Agriculture, 2017). This focus on social influence is considered important because children use food to fit in at home and school and/or as a basis for judging others (Roberts and Pettigrew, 2013; Stead et al., 2011).

However, the results of extant studies on the impact of social influence approaches on health intentions and behaviors are mixed (McEachan et al., 2011, 2016 vs. Riebl et al.,

2015), partly because of three limitations. First, previous research investigating the impact of social influence mainly focuses on injunctive norms, which identify what most people approve or disapprove of (Cialdini et al., 1990, 1991), such as “Doctors/parents/teachers/peers say children should eat 5 portions of fruit and vegetables a day”. However, the focus theory of normative conduct suggests that social norms also include descriptive norms, which describe what most people in a group do (Cialdini et al., 1990, 1991), such as “most children in your class eat 5 portions of fruit and vegetable each day”. Indeed, Binder et al. (2019), Berg et al. (2000) and Smit et al. (2018) demonstrate that including descriptive norms can increase predictive ability regarding healthy eating among children. Second, guided by the Theory of Planned Behavior (TPB) (Ajzen, 1985), previous research mainly focuses on using injunctive norm to encourage children’s health behavior via increasing their health intentions. In other words, extant literature in general assumes children’s health behaviors are deliberate and reasoned actions. But the Prototype Willingness Model (PWM) (Gerrard et al., 2008) suggests children’s health behavior can also be influenced by a more heuristic and unplanned process. Indeed, two health-related behavior meta-analyses (McEachan et al., 2011, 2016) conclude that injunctive norms are strong predictors of intentions, but not behaviors. Yet previous research provides little insights into why social norms influence children’s health intentions and behaviors differently. The third limitation of the extant literature is that previous nutritional health studies mainly focus on adolescents, with contradictory results (Berg et al., 2000; Gummesson et al., 1997; Smit et al., 2018; Stok et al., 2014) and limited research on younger children (Bazillier et al., 2011; Binder et al., 2019; Sharps and Robinson, 2017). However, no research has yet explored children’s developmental differences in their conformity to, or rejection of, different types of social influence.

Thus, the main purpose of this paper is to adopt a developmental perspective in understanding why children conform to different types of social norms (descriptive vs. injunctive) in relation to healthy eating. In order to do this, our research differentiates normative influence from different sources (peers vs. schoolteachers) to compare their impacts on children in middle childhood (7-to-11-year-olds) and adolescence (12-to-16-year-olds) and tracks the discrepancies between their health intentions and health behaviors. This paper mainly focuses on schooling, as it receives less research attention than family despite the role it plays in children's development of a healthy lifestyle (Mollborn and Lawrence, 2018).

Conceptual Background

The persuasiveness of social norms

Dissatisfaction with the effectiveness of factual information and economic inducements has led to the use of normative information as a primary tool to change a wide range of socially significant behaviors, such as littering (Cialdini et al., 1990, 1991), recycling (White and Simpson, 2013), energy conservation (Goldstein et al., 2008), and health-related behaviors (see McEachan et al. (2011, 2016) for reviews).

In terms of dietary behaviors, previous research tends to link normative information to the TPB (Ajzen, 1985) in understanding people's eating intentions and behaviors (Berg et al., 2000; Gummesson et al., 1997; Smit et al., 2018). A central argument of TPB is that intention is the most important predictor of behavioral change (Ajzen, 1985). This theory further holds that intention is determined by attitude (subjective evaluation of the behavior), subjective norms (perception of whether important others consider the behavior appropriate), and perceived behavioral control (belief about the capability to achieve the behavior) (Ajzen,

1985). However, it is noteworthy that, in TPB, subjective norms mainly focus on how people use others' expectations (an injunctive norm) to guide their behavior (Cialdini et al., 1990, 1991). While Cialdini and his colleagues suggest that injunctive norms can effectively change people's behavior (Cialdini et al., 1990, 1991), Prestwich et al. (2016) caution that their impact tends to be small. This is perhaps because, according to the PWM (Gerrard et al., 2008), behavior can be influenced via two different pathways: reasoned vs. social reactive. The reasoned pathway assumes behavior is the outcome of a deliberate process, and thus it is determined by intentions. In contrast, the social reactive pathway suggests behavior also reflects a heuristic and unplanned process, and thus it is determined by willingness to engage in the behavior (e.g., Fuchs et al., 2015; Todd et al., 2016). Thus, focusing on using injunctive norms to change behavior via increasing intentions may provide an incomplete picture.

Providing normative information on how others behave (a descriptive norm) can increase the predictability of TPB (Berg et al., 2000; Smit et al., 2018). According to the focus theory of normative conduct (Cialdini et al., 1991), descriptive norms provide information relevant to the goal of behaving effectively or accurately. Thus, they can be used as decision-making shortcuts (Cialdini et al., 1990, 1991). This is supported by the literature on the social modeling of eating, which suggests that people adapt their food intake to that of their eating companions, eating more or less depending on whether others do likewise (Binder et al., 2019; Cruwys et al., 2015).

Children's conformity to social norms

According to the moral stage theory (Kohlberg, 1971), young children's unilateral respect for adults (e.g. parents and schoolteachers) leads them to view norms as universal and

unalterable, accepting them without question. In order to gain approval and avoid punishment from their elders, young children adopt impression management tactics such as ingratiation, or use group norms (what the group majority does) as information shortcuts to guide their decisions (Corriveau et al., 2009). Young children cannot fully distinguish intentional actions from involuntary ones (Smith, 1978), and find it difficult to understand that the same actions can be motivated by different intentions (Baird and Moses, 2001). Thus, when making judgments, young children mainly focus on whether rules are violated, rather than actors' intentions (Kalish, 2012; Riggs and Kalish, 2016).

Kohlberg (1971) also suggests that, from mid-childhood, because of their increasing socialization with peers, children begin to understand that norms represent social agreements built on equality and cooperation. This is partly because, as children age, they begin to understand second-order mental states (Perner and Wimmer, 1985) and prejudice (Rutland et al., 2010). Thus, through negotiation, settling conflicts, and winning over friends with reason, children understand that norms emerge from group consensus but are changeable and instrumental (Kohlberg, 1971). This helps them foster positive relationships with peers and gain popularity (Garner and Waajid, 2008; Slaughter et al., 2015). Indeed, recent research has repeatedly demonstrated that when group norms are not consistent with those of social convention, older (but not younger) children tend to give priority to group-specific norms to demonstrate their affiliation (Haun and Tomasello, 2011; Killen et al., 2013; McGuire et al., 2018a, 2018b).

In short, previous literature suggests that as children age, adult influence decreases while peer influence increases (Kohlberg, 1971). It further suggests that as children's theory of mind steadily develops throughout their childhood, their understanding of norms becomes more sophisticated (Peterson and Wellman, 2018). However, to date, nutrition-based studies have not explored the implications of changing responses to social norms as children age,

which is identified by Riebl et al. (2015) as a core limitation of the extant literature. Therefore, one of the key aims of this research is to track developmental differences in children's conformity to different types of social normative influence.

Hypothesis Development

Descriptive norms provide information about behavior prevalence and reduce information uncertainty (Cialdini et al., 1990). However, conformity to injunctive norms requires an understanding of what behaviors are expected by others, and thus they are more difficult to process than descriptive norms (Cialdini and Goldstein, 2004). Therefore, we predict that children in both middle childhood and adolescence are likely to find descriptive norms easier to understand than injunctive ones:

H1: Descriptive norms are easier to understand than injunctive norms for children in both middle childhood and adolescence.

Berg et al. (2000) and Smit et al. (2018) suggest that descriptive norms can influence both children's health intentions and behaviors, with McEachan et al. (2011) identifying a larger influence on children than adults. Thus, we predict that descriptive norms will have a stronger influence on children in middle childhood than in adolescence:

H2: Descriptive norms have a stronger impact on children in middle childhood than in adolescence in terms of both healthy eating intentions and behaviors.

The focus theory of normative conduct suggests that conformity to injunctive norms can be driven either by a goal of affiliation or a goal of maintaining a positive self-image (Cialdini and Goldstein, 2004). While the motive of affiliation reflects people's desire for

social contact or belongingness (Veroff and Veroff, 1980), the motive of maintaining a positive self-image in public reflects people's use of injunctive norm conformity as an impression management tool for managing their image in public. The extent to which each of these motives affects nutritional intentions and behaviors in children is yet to be explored, which gives rise to four further hypotheses, as set out below.

A motive of affiliation should be reflected in children's responses to an injunctive peer norm (how peers think someone should behave). Injunctive peer norms have been shown to have a reliable influence on adolescents' food intake (see Stok et al. (2016) for a review). This is perhaps because adolescence is a period of development characterized by peer influence (Chein et al., 2011), with adolescents showing heightened sensitivity to positive social cues in the presence of peers (Breiner et al., 2017; Smith et al., 2018). In addition, the motivation to affiliate with peers is considered to develop as children age (Kohlberg, 1971; McGuire et al., 2018a, 2018b). Thus, if children's conformity to normative influence is driven by a goal of affiliation, then an injunctive norm indicating the majority of their peers' social approval of healthy eating should have a stronger influence on adolescents than those in middle childhood, affecting both intentions and behaviors (Slaughter et al., 2015). Thus:

H3a (affiliation): Injunctive peer norms have a stronger impact on adolescents than children in middle childhood in terms of both healthy eating intentions and behaviors.

However, if the motive for conformity is related to maintaining a positive self-image, then an injunctive norm can have a stronger impact on intentions than behaviors, because intentions tend to reflect people's rational reasoning and deliberate efforts (Ajzen, 1985). Thus, children in middle childhood are likely to use their health intentions as an impression management tool to maintain their positive self-image in front of adults, whereas adolescents are less inclined to seek to ingratiate themselves in the presence of adults (Slaughter et al.,

2015). However, impression management is mainly focused on public image, and may not influence behavior away from adult influence. Thus, the motivation to behave “appropriately” in front of adult researchers is greater for those in middle childhood than in adolescence (Kohlberg, 1971), but food choice in private should show no difference:

H3b (maintaining a positive self-image in public): Injunctive peer norms have a stronger impact on children in middle childhood than adolescents in relation to healthy eating intentions but not healthy eating behaviors.

In order to further discern a motive of affiliation from one of maintaining a positive self-image in public, this research also investigates children’s conformity to a normative message that indicates most schoolteachers’ social approval of healthy eating — an injunctive authority norm. If a goal of affiliation with peers underpins children’s conformity to normative influence, then an injunctive authority norm should have a similar impact on children across different developmental stages, because the affiliation is with peers, not authority (Chein et al., 2011; Garner and Waajid, 2008). Thus:

H4a (affiliation): Injunctive authority norms have a similar impact on children in both middle childhood and adolescence.

If maintaining a positive self-image in public underpins children’s conformity to normative influence, then an injunctive authority norm indicating schoolteachers’ social approval can have a positive impact on eating intentions among children in middle childhood because of their unilateral respect for adults. However, because adolescents want to develop an identity that is independent of adults (Steinberg, 2014), they may consider schoolteachers’ expectations of healthy eating as an attempt to limit their freedom of thinking. As a result, it may even backfire, leading to less healthy food consumption in adolescents due to psychological reactance (Brehm, 1966). This tendency to rebel increases during the first half

of adolescence, peaks at age 19, and declines thereafter (Breiner et al., 2017; Duell et al., 2018; Smith et al., 2018; Steinberg et al., 2018). Taken together, the different attitudes toward authority between younger and older children lead us to predict that an injunctive authority norm will have greater influence on children in middle childhood than in adolescence in terms of both intentions and behaviors:

H4b (maintaining a positive self-image in public): Injunctive authority norms have a stronger impact on children in middle childhood than in adolescence in terms of healthy eating intentions and behaviors.

Method

Sample, design and measures

In summer 2016, 405 children (218 girls) from three schools in Germany took part in the study, including 235 children in middle childhood (aged between 7 and 11) and 170 in adolescence (aged between 12 and 16). The research design was a 4 (social norms: descriptive vs. injunctive peer vs. injunctive authority vs. control) \times 2 (developmental stage: middle childhood vs. adolescence) between-subject design. Children's healthy eating intentions and behaviors were collected as key dependent variables. The former were gathered via asking their intentions to consume healthy food on a five-point single-item 'smiley' scale in front of adult researchers. The latter were gathered via asking them to make a food choice out of sight of the researcher, their schoolteachers and their peers. This was coded as a binary categorical variable, with 1 indicating the choice of a healthy snack and 0 not doing so. Another key variable was norm message understandability. This was measured by asking children whether they found the norm message easy to understand on a five-point

single-item smiley scale. In order to rule out alternative explanations, children's approval of the norm message, its believability, and their identification with the characters in the norm message were also collected. All these variables were also measured on a five-point single-item smiley scale (see Fig. A5 in the Appendix for a full list of the questions).

Stimuli

In the descriptive norm condition, the message indicated that most children eat fruit and vegetables every day as a snack. In the injunctive peer norm condition, the message indicated that most children think children should eat fruit and vegetables every day as a snack. In the injunctive authority norm condition, the message indicated that most schoolteachers think children should eat fruit and vegetables every day as a snack. In the control condition, the message focused on children's reading. All norm conditions were accompanied by the same image of children looking happy (see Fig. A1 to Fig. A4 in the Appendix). Pre-tests on schoolteachers and children of the same age groups suggested that these messages did not overlap with each other, and children expressed similar levels of identification with the characters in the different posters.

Procedures

Children were tested individually. In order to disguise the true purpose of the research, children were told that they were involved in a project to design a poster for children as part of a teacher-training course. After a few minutes studying the content of the poster, following the thought-listing task used in Campbell et al. (2016), children were solicited for a brief verbal description of the message in their own words as part of a manipulation check. Children could proceed to complete the questionnaire only if their verbal description of the

norm messages were consistent with the content of the messages they were given and did not overlap with the norm messages in other conditions. Then they were asked to fill in a short questionnaire to gather their liking of the message and its believability, its understandability, their identification with the characters depicted, and their intention to eat more fruit and vegetables. After completing and returning the questionnaire to the researchers, children were thanked for their participation and were offered the choice of a snack as remuneration. These snacks were laid out on a table in another room that was out of sight of the researchers.

Children were asked to choose one of the four snack options available: apples, grapes, chocolates and cookies. The first two snack options appeared in the social norm posters. In a pre-test with 20 children of the same age as those in the main study, we asked children whether they agreed that apples and grapes were healthier than chocolates and cookies (via a five-point single-item smiley scale). A one-sample *t*-test revealed that children's responses differed from the midpoint of the scale, suggesting that they regarded apples and grapes as more healthy ($t(19) = 27.61, p < .001, M = 4.9, SD = .31$). Our pre-test results also suggested that children considered these four options similar in terms of taste (apple: $M = 4.15, SD = .75$; grape: $M = 4.3, SD = .66$; chocolate: $M = 4.3, SD = 1.03$; cookie $M = 4.45, SD = .83$. $p > .05$ for each). In order to rule out any pre-existing brand preference, one unbranded snack of each kind was displayed on the table with the rest packed in sealed non-transparent paper bags (i.e. one unbranded apple was displayed while the rest of the apples were displayed in sealed non-transparent paper bags behind it). After each child left, their snack choice was recorded and replaced immediately to ensure that all snacks were available in equal numbers at all times. Children were asked not to open their snack bags until break-time, and to put them away in their schoolbags, which was controlled and enforced by their teachers. Full institutional ethical approval was granted for this study at the University of Bath, UK, and is

in line with institutional, German and UK national and international codes and concordats for research ethics and integrity.

Overall data analysis approach

Spearman's correlations between intentions and behaviors were utilized to identify the relationship between intentions and behaviors across conditions. Because intentions and behaviors were measured differently (a five-point scale for intentions vs. a binary categorical variable for behavior), different tests were applied to each dependent variable.

A 2×4 ANOVA was utilized to test the main effects of developmental stage and social norm type and their interaction on healthy eating intentions. In the hypothesis testing section, *t*-tests were utilized to test the impact of different social norms on younger (vs. older) children's eating intentions. This was done by comparing children's eating intentions across different developmental stages when the norm message was controlled for.

A binary logistic regression with children's actual food choice as the dependent variable, and developmental stage and social norm type as the independent variables, was utilized to test the main effects of developmental stage and social norm type and their interaction on healthy eating behaviors. In the hypothesis testing section, we used chi-squared tests to compare the impact of different social norms on younger (vs. older) children's eating behaviors. This was done by comparing children's food choices across different developmental stages when the norm message was controlled for.

Results

Manipulation check

The thought-listing manipulation-check task suggested that the children's verbal descriptions of the norm messages they were given were consistent with the contents of the messages and did not overlap with the norm messages in other conditions. For example, children in the injunctive authority norm condition indicated that the poster was about schoolteachers thinking children should eat healthily. No children in this condition suggested that the poster was about other children eating healthily (a descriptive norm) or about other children thinking they should eat healthily (an injunctive peer norm). The same pattern was also evident for the other conditions. Thus, our manipulation was successful. The results also suggested that liking, believability, and identification with the characters of the message did not differ across conditions ($p > .05$ for each).

Descriptive statistics

Panels A and B, respectively, of Table 1 present children's healthy eating intentions and behaviors across the different conditions, with their correlations reported in Table 2.

Table 1

Descriptive statistics of children's eating intentions and behaviors across conditions.

Panel A: Children's intentions to eat healthily across conditions

	Control	Descriptive	Injunctive Peer	Injunctive Authority
Children in middle childhood	3.94 (1.06)	4.52 (0.69)	4.5 (0.74)	4.86 (0.35)
Adolescents	3.8 (0.97)	4.08 (0.94)	4.02 (1.06)	3.75 (1.11)

Note. Cells show means and standard deviations (in parentheses).

Panel B: Children's choice of healthy snacks (%) across conditions

	Control	Descriptive	Injunctive Peer	Injunctive Authority
Children in middle childhood	50.80%	73.80%	64.70%	64.90%
Adolescents	46.00%	51.00%	53.30%	16.70%

Table 2

Spearman's correlations between eating intentions and behaviors across conditions.

	Control	Descriptive	Injunctive Peer	Injunctive Authority
Children in middle childhood	0.11	0.38**	0.21	0.04
Adolescents	0.24	0.36*	0.15	0.01

Note. ** $p < .01$ (two-tailed); * $p < .05$ (two-tailed).

Children's healthy eating intentions

A 2×4 ANOVA with children's intentions to eat healthily as the dependent variable, and social norm type and developmental stage as the independent variables, suggested that developmental stage had a main effect on healthy eating intentions: $t(403) = 5.14, p < .001$ $M_{\text{younger}} = 4.41, SD = 0.84$; $M_{\text{older}} = 3.94, SD = 1$. Social norms also had a main effect on healthy eating intentions: $F(3, 401) = 7.15, p < .001$. A Tukey post hoc test revealed that, when compared to the control group ($M = 3.88, SD = 1.01$), children had statistically significant higher intentions to eat healthily in the descriptive norm ($M = 4.33, SD = 0.83, p < .01$), injunctive peer norm ($M = 4.31, SD = 0.9, p < .01$), and injunctive authority norm ($M = 4.43, SD = 0.92, p < .01$) conditions. However, the different norm conditions did not differ from each other ($p > .05$ for each).

In addition, the interaction of developmental stage and social norms was also significant ($F = 3.91, p < .01$). For children in middle childhood, their eating intentions differed across conditions: $F(3, 231) = 12.62, p < .001$. A Tukey post hoc test revealed that, when compared

to the control group ($M = 3.94$, $SD = 1.06$), children had a statistically significant higher intentions to eat healthily in the descriptive norm ($M = 4.52$, $SD = 0.69$, $p < .01$), injunctive peer norm ($M = 4.5$, $SD = 0.74$, $p < .01$), and injunctive authority norm ($M = 4.86$, $SD = 0.34$, $p < .001$) conditions. Furthermore, children in the injunctive authority norm condition also had higher healthy eating intentions than those in the descriptive norm ($p < .01$) and injunctive peer norm ($p < .01$) conditions, although the latter two conditions did not differ from each other ($p > .05$). However, adolescents' eating intentions did not differ across conditions ($p > .05$).

Figure 1 provides a visualization of the interaction between developmental stage and social norms on children's intentions to eat healthily.

Please Insert Figure 1 about here

Children's healthy eating behaviors

A binary logistic regression with children's actual food choice as the dependent variable, and social norm type and development stage as the independent variables, suggested that the overall model was significant ($\chi^2(4) = 22.32$, $p < .001$). Developmental stage had a main effect on children's food choice ($Wald \chi^2(1) = 13.41$, $p < .001$), with older children less likely to eat healthily than younger ones: $b = -.76$, $p < .001$. The type of social norm also had a main effect on children's food choice ($Wald \chi^2(3) = 9.04$, $p < .05$). Compared with the control group, only children in the descriptive norm condition were more likely to eat healthily: $b = .64$, $p < .05$. The other two norm conditions did not differ significantly from the control group ($p > .05$ for each).

The results also suggest that the interaction between developmental stage and social norm was significant ($Wald \chi^2 = 8.25, p < .05$). For children in middle childhood, food choice marginally differed across conditions ($Wald \chi^2 (3) = 7.44, p < .06$). In particular, compared with the control group, only children in the descriptive norm condition were more likely to eat healthily: $b = 1.01, p < .001$. The other two norm conditions did not differ significantly from the control group ($p > .05$ for each). Adolescents' food choices also differed across conditions ($Wald \chi^2 (3) = 8.45, p < .05$). In particular, compared with the control group, children in the injunctive authority norm condition were less likely to eat healthily: $b = -1.45, p < .05$. The other two norm conditions did not differ significantly from the control group ($p > .05$ for each).

Figure 2 provides a visualization of the interaction between developmental stage and social norms on children's healthy eating behaviors.

Please Insert Figure 2 about here

Hypothesis testing: Norm understandability (H1)

Hypothesis 1 predicts that children in both developmental stages will find a descriptive norm message easier to understand than an injunctive norm one. To test this hypothesis, we conducted a one-way ANOVA with children's understanding of the norm message as the dependent variable and type of social norm as the independent variable. Our results suggest that for both developmental stages, children's understanding of the norm differed across conditions ($F(3, 401) = 7.81, p < .001, M_{\text{descriptive}} = 4.69, SD = 0.6; M_{\text{injunctive peer}} = 4.36, SD = 0.72; M_{\text{injunctive authority}} = 4.41, SD = 0.87$). In particular, a Games–Howell post hoc test revealed that the descriptive norm was considered easier to understand than both the

injunctive peer norm ($p < .001$) and the injunctive authority norm ($p < .05$), but the two injunctive norms did not differ from each other ($p > .05$). This lends support to H1.

Hypothesis testing: The impact of descriptive norms on different developmental stages (H2)

Hypothesis 2 predicts that a descriptive norm message has a greater impact on younger (vs. older) children's eating intentions and behaviors. The results suggested that children in middle childhood had a higher intention to consume fruit and vegetables ($t(114) = 2.95, p < .01, M_{\text{younger}} = 4.52, SD = 0.69; M_{\text{older}} = 4.08, SD = 0.94$), and were more likely to choose healthier snacks than adolescents ($\chi^2(1, N = 116) = 6.47, p < .05$). While 73.8% children in middle childhood chose apples or grapes, only 51% of adolescents did so. This supports H2.

Hypothesis testing: The impact of injunctive peer norms on different developmental stages (H3)

Hypotheses 3a and 3b are competing hypotheses to explore whether norm conformity was motivated by affiliation or maintaining a public self-image. While H3a predicts that an injunctive peer norm has greater impact on older (vs. younger) children in relation to both intentions and behaviors (motivated by affiliation), H3b suggests that it has greater impact on younger (vs. older) children in terms of eating intentions but not eating behaviors (motivated by impression management). Our results suggest that children in middle childhood had a significantly higher intention to consume fruit and vegetables than did adolescents ($t(111) = 2.83, p < .01, M_{\text{younger}} = 4.50, SD = 0.74; M_{\text{older}} = 4.02, SD = 1.06$). However, children's snack choice did not differ across different developmental stages ($p > .05$). Thus, H3b was supported while H3a was rejected.

Hypothesis testing: The impact of injunctive authority norms on different developmental stages (H4)

Hypotheses 4a and 4b are also competing hypotheses to further test norm conformity motivation. While H4a predicts that an injunctive authority norm has similar impacts on younger and older children, H4b suggests that it has a greater impact on younger (vs. older) children in terms of healthy eating intentions and behaviors. Our results suggest that children in middle childhood had a significantly higher intention to consume fruit and vegetables than adolescents ($t(59) = 4.76, p < .001, M_{\text{younger}} = 4.86, SD = 0.34; M_{\text{older}} = 3.75, SD = 1.11$). In addition, younger children were more likely than older ones to choose healthier snacks ($\chi^2(1, N = 61) = 13.17, p < .001$). While 63.4% of children in middle childhood chose apples or grapes, only 16.7% of adolescents did so. This, therefore, lends support to H4b while causing H4a to be rejected.

Discussion

In a recent review, Stok et al. (2018) point out that the extant literature on children's eating behavior focuses heavily on individual-level factors (e.g., food belief) while interpersonal-level factors (e.g., social norms) receive limited attention. Following previous studies on interventions to change norms (see Prestwich et al. (2016) and Sheeran et al. (2016) for reviews), this research adopts an experimental design to understand why children conform differently to different types of social (descriptive vs. injunctive) norm messaging on healthy eating. This is done via comparing children's responses to different social norms across different developmental stages, and investigating any discrepancy between their

healthy eating intentions and healthy eating behaviors (see Table1). The experimental results suggest children mainly use a descriptive norm as an information shortcut as to how to behave “appropriately”. Thus, although both young and old children consider it easier to understand than an injunctive norm, it has a greater impact on younger children than older ones.. The experimental results further suggest that an injunctive norm mainly influences children via activation of the motive to maintain a positive self-image in public, rather than the motive of affiliation. If children’s conformity to normative influence was driven by their desire for affiliation with their peers, then an injunctive norm that indicates the majority social approval of peers should have had a stronger impact on adolescents, because the latter rely on their peers in formulating an identity and obtaining social approval (Steinberg, 2014). However, the results suggest the opposite, with children in middle childhood showing higher conformity to an injunctive peer norm than adolescents (see Figure 1). However, this is only evident in their intentions to eat healthily, and not their actual snack choices (see Figure 2). Thus, the discrepancy between their intentions and actual behaviors suggests that children mainly use conformity to normative influence for the purpose of impression management, maintaining a positive self-conception in front of the adult researchers. Indeed, it is an injunctive authority norm (schoolteachers’ social approval) that gives children in middle childhood the highest intentions to eat healthily (see Figure 1), although their actual snack choices show no difference to those in the control group (see Figure 2). Conversely, an injunctive authority norm reverses in influence among adolescents, making them least likely to choose a healthy snack (see Figure 2), perhaps because adolescents consider the explicit request from their schoolteachers as limiting of their autonomy (Stok et al., 2014), causing them to behave oppositely due to psychological reactance (Brehm, 1966). Alternatively, because risk-taking is a heightened feature of adolescence (Breiner et al., 2017; Duell et al., 2018; Smith et al., 2018; Steinberg et al., 2018), adolescents in our study may have decided

to choose less healthy snacks to demonstrate rebellion against authority and impress their in-group peers (Killen et al., 2013; McGuire et al., 2018a, 2018b). These results have important implications for social norms literature, TPB, PWM and moral stage theory. The next section discusses this in detail.

Theoretical implications

Our research contributes to the TPB in two different ways. First, In line with Berg et al. (2000) and Smit et al. (2018), we confirm that the predictive accuracy of TPB studies would be improved by the inclusion descriptive norms. At present most studies utilizing TPB include only an injunctive norm (perceptions of whether important others would see a behavior as appropriate), which our study, supported by McEachan et al.'s (2016) meta-analysis, suggests only impacts publically espoused intentions, not behavior as the TPB model is trying to predict. Indeed, our results (see Figure 2) indicate that descriptive norms are stronger antecedents to behavior, and injunctive norms (as shown in Figure 2) can have an oppositional effect in certain groups (adolescents in our study), depending on who the perceived source of “important others” are. Therefore TPB studies with a behavioral dependent variable should include a descriptive norm in addition to the extant injunctive norm espoused in traditional TPB approaches (Ajzen, 1985). Second, assuming behavior is driven by rational and deliberate processes, a central argument of TPB is that intention is the most important predictor of behavior change (Ajzen, 1985). However, in our study it was only the descriptive norm condition in which intention and behavior were statistically significantly correlated (see Table 2). Thus, our research suggests children' health behavior, are not always rational and focusing on health intentions alone may provide an incomplete way of encouraging healthy behavior.

We also contribute to the PWB (Gerrard et al., 2008) on several fronts. First, our research demonstrates that for injunctive norms children's health intentions and health behavior were not statistically significantly correlated (see Table 2). This provides support to the PWB that children's health behavior can be driven by two different processes: reasoned vs. social reactive. Thus, future interventions should focus on both processes to more effectively change children's health behavior. Second, the discrepancy between children's intentions and actual behaviors highlights the importance of willingness to engage in the behavior as a key factor to drive children's behavior (Gerrard et al., 2008). Indeed, previous research has documented that children think that those who enjoy healthy food are "geeky", "uncool" and "not popular" (Stead et al., 2011). Thus, while children acknowledge the benefits of eating healthily, the negative prototype image of healthy eaters could make them unwilling to choose healthy snacks. Thus, as suggested by Todd et al. (2016), future interventions can focus on changing children's prototype images to encourage their willingness to engage in health behavior.

Our research also extends the moral stage theory (Kohlberg, 1971) in two ways. First, a central argument of the moral stage theory is that normative influence from adults (e.g. parents and schoolteachers) decreases with age. The fact that an injunctive authority norm has opposite influence on younger (vs. older) children provides clear support to this. However, the moral stage theory also argues that normative influence from peers increases with age (Kohlberg, 1971). However, for both a descriptive peer norm and an injunctive peer norm, they have a stronger impact on younger (not older) children. This is perhaps because our findings suggest children mainly use normative conformity for impression management purposes. As a result, younger (vs. older) children were more likely to conform to social norms to maintain a positive image in front of adult researchers.

Finally, our research also contributes to social norms literature in two important ways. First, McEachan and her colleagues' meta-analyses (McEachan et al., 2011, 2016) conclude that injunctive norms are stronger predictors of people's health intentions and descriptive norms are stronger predictors of people's health behaviors. However, why injunctive and descriptive norms can influence intention and behavior differently remains unclear. A possible explanation for this finding, as suggested in this study, is that children mainly use injunctive norm conformity for impression management purposes. This, therefore, suggests that injunctive norms can have a strong impact on intention, because intention tends to reflect people's rational reasoning and deliberate efforts (Ajzen, 1985). In this research, children may be fully aware of the benefits of eating healthily. Thus, they use their healthy eating intentions to build and maintain a positive public image. However, behavior is different from intention because behavior can be influenced without conscious awareness (Sheeran et al., 2013). This is especially evident in the social modeling of eating, where people adapt their food intake to that of their eating companions through non-conscious mimicry (Cruwys et al., 2015). However, it requires relevant norm information to be assessable such that it can influence behavior at the point of decision (Schuz et al., 2018). Thus, descriptive norms that provide information about behavior prevalence (Cialdini et al., 1990, 1991) provide a stronger influence on children's healthy eating behaviors in our study. Second, existing literature tends to focus on injunctive norms, but with contradictory results for their impact on adolescents (e.g., Åstrøm and Okullo, 2004; Berg et al., 2000; Branscum and Sharma, 2011; Hewitt and Stephens, 2007). While Åstrøm and Okullo (2004) suggested that injunctive norms had no impact on adolescents' food consumption, Berg et al. (2000) reported that injunctive norms had a stronger impact on their intentions than their behaviors. In addition, both Branscum and Sharma (2011) and Hewitt and Stephens (2007) reported that injunctive norms influenced adolescents' food consumption intentions, which, in turn,

predicted their food behaviors. The findings in this paper aid our interpretation of these apparently contradictory results because they suggest that injunctive norms are mainly influencing children via activation of the motive to maintain a positive self-concept (impression management), rather than that of affiliation. Thus, when the motive of impression management is not activated, children are less likely to show social norm conformity, giving rise to no discernible impact (e.g., Åström and Okullo, 2004). When an impression management motive is activated, social influence is more evident on their intentions than their behaviors (e.g., Berg et al., 2000). However, when self-reporting approaches are used to gather both their intentions and their behaviors and an impression management motive is activated (e.g., Hewitt and Stephens, 2007), social norms can influence both variables.

Practical implications

The challenge of childhood obesity has attracted significant academic attention in the past few decades (Stok et al., 2018). This paper provides new empirical evidence in relation to the effectiveness (or otherwise) of using social norms to promote healthy eating among children. For children in middle childhood, the experimental results suggest that both descriptive norms and injunctive norms can increase their intentions to eat healthily. However, only descriptive norms make them significantly more likely to choose healthier foods thereafter, and also provides the only significant relationship between intention and behavior in this developmental stage. This suggests that for children in middle childhood, providing information about behavior prevalence is more effective than informing them about what behaviors are expected. However, very recently, Binder et al. (2019) have found that when children are aware that only a minority of their peers eat fruit, they are less likely to choose it afterwards. Thus, because descriptive norms provide a standard for people to follow, they may have a boomerang effect if children's current behavior is above that standard, and a

campaign that seeks to use descriptive norms to promote healthy eating must build on children's current behavioral standards.

For children in adolescence, the experimental results suggest that neither descriptive norms nor injunctive norms can increase their healthy eating. More worryingly, an injunctive norm indicating schoolteachers' approval of healthy eating decreases (rather than increases) their healthy eating afterwards. Together, these results challenge the effectiveness of using social norms to promote healthy eating among adolescents.

Conclusions

This study identifies that children mainly use a descriptive norm as an information shortcut to behaving "appropriately". We identify a descriptive norm as having a positive effect in both intentions to eat healthily and choosing a more health snack. We find this to have a stronger impact on younger children than older ones, although both young and old children consider it easier to understand than an injunctive norm. The experimental results further suggest that an injunctive norm mainly influences children via activation of a motive for maintaining a positive self-image in public, rather than one of affiliation. We therefore find injunctive norms to have little to no impact on increasing health snack choices, and in the case of injunctive authority norms has a significant and negative effect on healthy snack choice in adolescents. These results are important for social research on health, as this is the first study to investigate developmental differences in responses to social norm messaging in nutritional health as children age. This study helps us to explain why different social norms influence health intentions and behaviors differently. For injunctive norms, the lack of statistically significant correlations between children's health intentions and behavior questions whether

children's health behavior is only driven by rational and deliberate process as the TPB assumes (Ajzen, 1985). Instead, our research provides support to the PWB (Gerrard et al., 2008) that children's health behavior can be influenced via different processes. Thus, understanding children's existing prototype images and their willingness to engage in the behavior are also important. In addition, our finding that injunctive norm conformity is mainly used for impression management purposes can reconcile existing contradictory results on the impact of social norms on children.

Limitations and directions for future research

The experimental findings and their implications should be regarded in light of the following limitations. First, this study was conducted in Germany among children aged between 7 and 16. Thus, whether our results can be generalized to children in other age groups and in other countries awaits future research. Second, our research shows no significant variance in either intentions or behaviors in the control condition by developmental stage. A lack of extant work investigating developmental differences in snack choice makes it difficult to determine whether our results are due to a statistical aberration. Thus, whether children have developmental differences in relation to healthy eating in general awaits future research. Third, in the research, children's intentions and actual behaviors were gathered immediately after their exposure to different social norms. Thus, this study provides little insights as to the impact of social norms in the longer term. Longitudinal research is needed to track children's healthy eating over time. Fourth, in this research, children were exposed to different social norms via a poster in the classroom. However, children usually consume their snacks or meals in school cafés or restaurants, and future research should replicate this study in a more realistic setting to see if the results still hold.

Finally, this research only focuses on the school environment, but family is also one of the key environments to influence children's healthy eating. Thus, more research is needed to explore how social norms within the family influence children.

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Appendix

**Wusstest Du, dass die meisten Schüler jeden
Tag Obst und Gemüse als Snack essen?**



Fig. A1. The poster featuring a descriptive norm. [English translation: Did you know that most children eat fruit and vegetables every day as snacks?]

**Wusstest Du, dass die meisten Schüler denken, ihre
Mitschüler sollten jeden Tag Obst und Gemüse als
Snack essen?**



Fig. A2. The poster featuring an injunctive peer norm. [English translation: Did you know that most children think children should eat fruit and vegetables every day as snacks?]

**Wusstest Du, dass die meisten Lehrer denken,
Schüler sollten jeden Tag Obst und Gemüse als
Snacks essen?**



Fig. A3. The poster featuring an injunctive authority norm. [English translation: Did you know that most schoolteachers think children should eat fruit and vegetables every day as snacks?]

**Wusstest Du, dass lesen die beste Übung für
Dein Gehirn ist?**



Fig. A4. The poster in the control group. [English translation: Did you know that reading is the best exercise for your brain?]

FR#: _____

1. I like the poster.



2. I understand the poster.



3. I believe the poster.



4. The children in the poster are like me.



5. I want to eat more fruit and vegetables.



Fig. A5. A sample of the questionnaire for children.